

and restless; when feeding it does so after the manner of a Tree-creeper, searching the bark for insects, climbing upwards around the trunk and swinging under branches, until, having passed the undergrowth, it darts to the base of another tree.

[The two specimens sent (178 ♂ and 182 ♀) are both young birds, and show no traces of the fulvous throat-spot which distinguishes the adult.—P. L. S.]

14. *SYNALLAXIS*, sp. inc.

[The specimen sent (176 ♂) is quite a young bird in immature dress, probably referable to *S. albens* (Arg. Orn. i. p. 179).—P. L. S.]

—15. *FALCO FUSCO-CÆRULESCENS* (Arg. Orn. ii. p. 69).

Fairly common from March to August. It seems to consider "*Tinnunculus cinnamominus*" its special enemy. I have often seen the latter chased away from the roosting-place of the former when it had ventured too near. The chase is very spirited, the smaller hawk, by its abrupt turns, easily baffling its pursuer.

[The skin sent (162 ♂) is that of a male in full plumage. "Iris black."—P. L. S.]

XLV.—*A Review of the Species of the Family Pittidæ.*

By JOHN WHITEHEAD.

THE objects of this paper are: to bring up to date our knowledge of the *Pittidæ*, to correct a few errors in previous descriptions of the colours of the soft parts, to propose to unite certain species which I do not regard as distinct, to separate others which appear to me to have been wrongly united, and to suggest a more natural arrangement of the members of the family.

The colouring of the soft parts of these birds, when recorded, appears to have frequently been taken from the dried skins. For example, the feet of *Eucichla boschi* are variously described as "brown" (Selater, Cat. Birds B. M. xiv. p. 447), "olive-brown" (Wallace, *Ibis*, 1864, p. 105), and "dirty blue in front,

pale straw-colour behind" (II. O. Forbes, Ibis, 1882, p. 63). Again, Mr. Selater's statement that the feet of *Pitta granatina* are "brown," and Mr. Wallace's assertion that they are "black," must surely be disregarded in favour of Mr. Everett's record (Ibis, 1877, p. 10) that they are "leaden blue," inasmuch as those of its ally, *Pitta ussheri*, are light bluish grey. In the 'Birds of Asia' Mr. Gould has coloured the legs of the Pittas according to fancy—those of *Eucichla boschi* being shown as light brown, and those of *E. baudi* as pink, while the legs of several other species are also wrongly coloured.

The eggs of the Pittas, are either white, or white slightly spotted with dark purple, not unlike those of the Orioles.

The young have a plumage peculiar to immaturity and very different from that of the adult bird. The nestling plumage, generally speaking, is brown, resembling that of the adult in *Hydrornis* and that of the female of *Gigantipitta*, which forms are probably more like the ancestral typical *Pittæ* than any other members of the genus. This opinion I find is contrary to that of Mr. Wallace, who, writing on the two genera above mentioned, says, "these species depart most from the typical characters of the genus." In point of date the buff-breasted group, of which *P. cyanoptera* may be regarded as the type, is certainly older than the green-breasted section, of which *P. cucullata* is typical. The nestlings of the buff-breasted section are somewhat like the adults, while those of the green-breasted division are certainly more like those of the first-mentioned group than their own parents. The young of *Pitta maxima* gives us an interesting illustration of this fact, having buff on the breast. The ornamental shoulder-patch and rump-band are generally either absent or very dull in the first plumage; but some species seem to be gradually abandoning such ornamentation (such as *P. maxima* and perhaps *P. novæ-guinææ*), so that the young of the first-mentioned species has a clearer rump-band than the adult; but I have not seen nestlings of *P. novæ-guinææ*. The ancestral plumage retained by the nestling sometimes reappears in the fully adult; for example, I have a perfectly mature specimen of *Pitta muelleri* which has the white throat

of the first plumage. I do not attach any value to the amount of white on the primaries in distinguishing species, as it is greatly a question of age. Some species have, when mature, abandoned the white, such as *P. forsteni* and *P. steerii*, though this mark appears on the wings of the latter species in its first plumage, and probably in the young of *P. forsteni*, with which I am unacquainted. Other species, on the other hand, have increased the amount of white on the primaries. *P. muelleri* and *P. atricapilla* when adult have more white than when immature.

The young of the section of *P. ussheri* are somewhat different from those of other Pittas; nevertheless many characters are still present. An interesting link in coloration is, however, to be found in the young of *P. arcuata*. This might be easily mistaken for the young of one of the section of *P. erythrogastra*, which are, generally speaking, insignificant dull brown birds, and somewhat resemble *Hydrornis*. In *Eucichla* also, so far as I have been able to make out, the nestlings are dull brown. So we may conclude that, as the young of the Pittidæ in nearly every case are dull brownish birds, their ancestors were similar in plumage to *Hydrornis* and *Gigantipitta*.

The coloration of the adults in the Pittidæ is generally gorgeous—green, blue, scarlet, and yellow being the general colours of the family. Ornamentation usually takes the form of highly glossy metallic shoulder-patches, uropygial and pectoral bands, and in the *Eucichla* section, which are not thus adorned, of striped breasts and gaudy heads and tails.

Hydrornis has not become very beautiful and has no ornamental plumage. The male of *Gigantipitta* has gained a clear pale blue back, which is absent in its female. *P. cyanoptera* and its allies differ much in the amount of their ornamentation, though the general coloration of this group is very similar. *Pitta cyanoptera* and its geographical allies have much larger shoulder-patches and rump-bands than the other members of the group from Australia and the islands to the east of Java, though at the same time they

have less or no black on the chin and on the median patch. This to some extent applies to the green-breasted group, which is closely allied to the buff-breasted section. The green Pittas of the Soudaic Islands and the Philippines have also larger ornamental patches than the members of their group found in New Guinea and Celebes. The Sanghir species, I should imagine, is a somewhat modern immigrant to that island, as the species is very similar to *P. atricapilla* of the Philippines. *Pitta maxima* and *P. steerii* have small rump-bands—the former species having almost abandoned this mode of ornamentation,—but they have more wing-decoration than any other members of their group. The green Pittas of New Guinea are of a very much darker green in general coloration, and have the flanks of deep purple and blue. All the species of these two groups have a median patch of bright scarlet, which is in some cases edged with black, on the abdomen.

The group of *Pitta ussheri* is very different in coloration from the last two groups, and is connected through one member of its section (*P. arcuata*) with the next or group of *P. erythrogastra*—all the birds of these two sections having bright scarlet underparts with black or white bases to the feathers. *P. venusta* is somewhat different, looking like a dull specimen of *P. ussheri*.

The dull blue and green backs of the group of *P. erythrogastra* approach somewhat the coloration of *Gigantipitta*.

The last group, *Eucichla*, may be divided into two sections—those inhabiting the mainland of Asia, without a white bar on the wings (*E. boschi* excepted), and those from the Asiatic Islands of the Archipelago, which have all a white bar on the wings. The insular forms, with one exception, have longer tails. The general coloration of this group is: above brown or red; heads ornamented with yellow or orange superciliaries or with a blue crown; breasts barred—sometimes the bars are massed, as in *E. baudi*, *E. boschi*, and *E. gurneyi*, the pectoral band of *E. cyanura*, and median-patch of *E. schwaneri*. *E. cyanea* retains the dull bluish back and is less conspicuously ornamented. The female of

E. ellioti has a dull green back. Both these species are continental. The sexes differ, the underparts of the females of *E. gurneyi*, *E. baudi*, and *E. boschi* bearing but slight resemblance in colour to their males. In *E. baudi* the pattern of the markings in the male differs from that of the markings in the female, but the coloration of the back is often similar in both sexes.

Any remarks that might be made in attempting to account for the present geographical distribution of Pittas must necessarily be purely conjectural. The elevation and submergence of the different islands, together with the consequent migrations and remigrations of species, make any attempt at describing the former ranges of the Pittas as compared with their present distribution impossible. For example, *Pitta muelleri* is found in Borneo and Sumatra, *P. bangkana* on the intervening island of Banka, and on the nearest large area of land is *P. cucullata*. If the last-mentioned species were also found in Sumatra, or if the green *Pitta* of Sumatra were peculiar to it, it would easily be understood. Java has apparently been missed by all migrations except that of *Eucichla*.

That the greater number of species and subgenera (with the exception of those of the *P. erythrogastra* group) are to be found on the mainland of Asia, and in the great Asiatic island of Borneo, and that the young of nearly all species resemble an Asiatic genus more than they resemble their own parents, are facts which suggest the theory that the Asiatic branch is the most ancient, and has moved least from its original position. According to this supposition the submerged parts of the continent between Southern Asia and Borneo would be a centre from which the lines of migration would radiate, and the focus of the genus.

The mainland of Asia and the island of Borneo together possess no less than 19 species of Pittidæ; by the addition of the great islands of Sumatra and Java and Banka only three species are added, making in all 22. The islands of Sumatra and Java are remarkably poor in isolated species, *P. venusta*

only being peculiar to Sumatra; though, on account of the resemblance *E. boschi* bears to the *Eucichlæ* of Java and Borneo, I think that it was probably at one time peculiar to that island and has migrated to the Malay Peninsula. Java has one species peculiar to it—*E. cyanura*. Of the 27 species left, one is African. Of the 26 found throughout the rest of the Archipelago and Australia, twelve belong to the section of *P. erythrogastra* (some of these being of dubious validity), which is not represented amongst the true Asiatic forms. If the 5 species that inhabit the Philippines (which belong, perhaps, rather to the Asian division of land) be deducted, we find the great Austro-Malayan division reduced to 21, only two more than the division of the Asian mainland and Borneo.

After these preliminary remarks I will proceed to review the different genera of the family.

Genus I. HYDRORNIS.

Hydrornis is composed of three species, two of which are distinct, and one (*H. soror*) is of doubtful value. The size is large, the general colouring beneath dull brown, above dull bluish green.

A fourth species (*Gigantipitta*) is closely allied to this genus, especially as regards its female, which is without the black crown on the head and is of a dull brown all over, except the rump and tail, which are light blue. The superciliary stripes of the male, the black crown, and the blue back remind us of true *Pitta*.

Range. The members of this group are not widely dispersed, *Hydrornis* being found in the countries to the north of the Malay Peninsula, whilst *Gigantipitta* extends over the Malay Peninsula, Sumatra, and Borneo.

1. HYDRORNIS NIPALENSIS.

Pitta nipalensis, *Scl. Cat. B. xiv. p. 414.*

“Bill dusky, fleshy at the base; legs ruddy flesh-coloured; nails long, whitish; irides lightish brown” (*Jerdon*).

2. HYDRORNIS SOROR.

Pitta soror, Scl. op. cit. p. 415.

There seems some doubt as to the locality of the single specimen of this species, and as to whether it may not be merely a slightly abnormal specimen of *H. nipalensis*; but until further examples are received I am unable to express an opinion on it.

3. HYDRORNIS OATESI.

Pitta oatesi, Scl. op. cit. p. 416.

Genus II. GIGANTIPITTA.

GIGANTIPITTA CÆRULEA.

Pitta cærulea, Scl. op. cit. p. 416.

This species forms a connecting-link between the first section (*Hydrornis*) and the second (true *Pitta*), and for that reason I have adopted a generic title for it, so as to distinguish it from both sections of the genus.

Genus III. PITTA.

a. Group of *P. cyanoptera*.

A compact group composed of nine species. The general colours are : chin and throat white or black or of both colours, breast buff or greenish yellow, median patch dark or light crimson only or crimson and black; head brown and black, with superciliary stripe of yellow, at times with a bluish tinge; shoulder-patch large or small, green; rump-band broad or narrow, of deep glassy blue or light silvery green. *P. angolensis* is slightly exceptional in its general distribution of markings. The sexes are similar.

1. PITTA CYANOPTERA.

Pitta cyanoptera, Scl. op. cit. p. 420.

Iris and bill greyish black; legs pale yellowish pink.

2. PITTA MEGARHYNCHA.

Pitta megarhyncha, Scl. op. cit. p. 421.

Similar to *P. cyanoptera*; but the crown of the head more dusky brown, the central black stripe almost absent; back, scapulars, and inner secondaries of a brownish green, very different from the clear glassy green of the upper parts of *P. cyanoptera*. Bill considerably larger.

3. PITTA NYMPHA.

Pitta nympha, Sel. op. cit. p. 425.

Pitta bertæ, Sel. op. cit. p. 425.

The specimen of *P. bertæ* in the British Museum answers equally well to Swinhoe's descriptions of *Pitta nympha* and *P. bertæ*. Dr. Selater is unable to separate *P. nympha* from *P. oreas*, and is doubtful as to the validity of *P. bertæ*. There is little doubt in my mind that *P. bertæ* is identical with *P. nympha*, and that the specimen was of accidental occurrence in Borneo.

The pale washed-out colours of the underparts of this species, resembling as it does a pale-coloured *Pitta cyanoptera*, is most interesting, and is probably due to climatic influences. A similar differentiation may be noticed in specimens of *P. brachyura*, but that species is not far enough advanced in modification to be separated into two. Supposing, however, the paler specimens were by some geographical change to be isolated from the darker ones, they would doubtless soon show as great differences as those now exhibited by *P. cyanoptera* and *P. nympha*.

4. PITTA BRACHYURA.

Pitta brachyura, Sel. op. cit. p. 423.

The young have the superciliary feathers greyish brown, edged with black; the upper part of the back greyish green, the lower part dull green; shoulder-patch and rump-band smaller than in the adult and dull blue; the upper part of the breast greyish yellow; the lower belly and crissum pale pink. The green and blue feathers of the back in some specimens are broadly centred with black; this is probably the second plumage.

Specimens from the district of Mount Aboo (North-west India) differ from their more eastern representatives in being greener throughout; the superciliaries have a distinct greenish tinge; the breast is of a lighter sandy buff, with a greenish tinge on the sides; the back of a lighter greenish blue, the ochreous tinge being absent; the shoulder-patch and rump-band are of a lighter silvery green.

This species in the more western portion of its range has

had its coloration influenced by climate (probably by greater rainfall), and shows a decided tendency to increase the brightness of the green upper parts, and to lose the yellows of the head and underparts, which have now attained a decided green gloss. On the other hand, specimens from Eastern India are often of a decided yellowish tinge on the upper part of the back.

The same causes joined to more perfect isolation have probably brought about the differences between *Pitta cyano-ptera* and *P. nympha*.

5. PITTA ANGOLENSIS.

The young are : above dull brownish green, throat pinkish white, belly pale scarlet, while the terminations of the wing-coverts are not so large nor so vividly blue as in the adult.

The nearest geographical ally of this interesting species is *Pitta brachyura*, which species *P. angolensis* most nearly resembles. The scarlet of the underparts is more developed than in any species of this group of Pittas, the chin and throat being also suffused with the same colour; the wing- and rump-adornments are also highly developed, the climate of West Africa having agreed with the descendants of what at some distant period was in all probability an emigrant flock of *P. brachyura*.

6. PITTA VIGORSI.

Pitta vigorsi, Scl. op. cit. p. 426.

To the localities of Banda and Timor-laut, the Island of Dammar may be added. "Bill black; iris dark brown; feet pale yellowish horn-colour" (*Wallace*).

7. PITTA CONCINNA.

Pitta concinna, Scl. op. cit. p. 426.

The young are brown on the breast, they have the flanks brownish buff and show a pale pink median patch; the back is duller brownish green; the shoulder-patch and rump-band are smaller and less bright in colour. "Bill black; iris dark brown; feet pale yellowish horn-colour" (*Wallace*).

8. PITTA IRENA.

Pitta irena et *P. crassirostris*, Sel. op. cit. p. 427.

Similar to *P. concinna*, but differs in having the tail black and tipped with green, whereas in the latter species the whole of the feathers are decidedly greenish; the superciliary stripe is uniformly narrow, and of a pale sandy yellow changing into pale blue on the nape. The black is confined to the chin and does not stretch down the throat as in *P. concinna*. This species also comes near to *P. vigorsi*, but has a black chin and a lighter buff under-surface.

In my opinion *P. crassirostris* has no claim to specific rank, being only a very slightly removed subspecies. The only differences are its slightly larger dimensions.

Mr. Wallace no doubt founded *P. crassirostris* on a comparison of it with *Pitta vigorsi* and *P. concinna*; while, if he had compared it with *Pitta irena*, it is doubtful whether he would have distinguished it.

9. PITTA STREPITANS.

Pitta strepitans, Sel. op. cit. p. 428.

Dr. Sclater rightly regards *Pitta simillima* as only subspecifically distinct from *Pitta strepitans*, the differences between the two races being merely of size.

The young in the second plumage have little signs of the black median patch, no feathers being entirely free from scarlet markings; the chin is also less black; the feathers of the back, as in *P. brachyura*, are broadly centred with black. In the first plumage the crown of the head is dull brown, the feathers being edged with black; the upper part of the breast of a dull yellowish brown, lighter on the flanks; chin whitish grey, slightly yellow on the throat; lower belly pale pink, without a black patch; the upper parts dull green.

b. Group of *P. cucullata*.

This group is composed of twelve species, the first six of which are closely allied. The next three (Nos. 7, 8, 9), forming the New Guinea division, are much darker in general coloration. No. 10, the darkest, stands alone. The last two species

(11, 12) are very different from the rest of this section, but still undoubtedly belong to it.

The general colouring of this group is green above and beneath, black in No. 10; the median patch is scarlet, or black and scarlet; the metallic ornamentation is as in the group of *P. cyanoptera*.

1. PITTA CUCULLATA.

Pitta cucullata, *Scl. op. cit.* p. 442.

Young: breast brown; head light brown, back dull green; rump and wing-patches dull blue.

2. PITTA BANGKANA.

Pitta cucullata, *Scl. l. c.* (part.).

Dr. Sclater has united this species with *P. cucullata* in his synonymy, though an example from Banka Island appears in his list of specimens under *P. muelleri*; but in my opinion *P. bangkana* is distinct and intermediate between *P. cucullata* and *P. muelleri*.

Head rusty black, more brownish on the forehead, general colouring of more yellowish green; and upper part of median patch slightly blacker than in *P. muelleri*.

Hab. Island of Banka or Bangka.

3. PITTA ATRICAPILLA.

Pitta atricapilla, *Scl. op. cit.* p. 438.

Young, *first plumage*. Head rusty brown; cheeks, nape, and sides of head rusty black; throat at base of bill dusky black; rest of throat and sides of neck dull white; back, scapulars, and outer secondaries dull brownish green; breast and flanks brownish buff; median patch pale pink. No shoulder-patch; a broad rump-band of bright blue. Wings: primaries black, with a large white speculum; secondaries dusky black, broadly edged with green; six secondary coverts centred with a large white spot, forming a distinct white bar. Bill brown tipped with orange; legs brown.

(Described from Palawan specimens.)

This species is easily distinguished from *P. muelleri* by having the centre of the belly black, the scarlet on the

underparts covering less than half the space when compared with that species. The metallic colour of the shoulder-patch and rump-band is also deeper and of a silvery blue.

Gould, in the 'Birds of Asia' (vol. v. pl. 76), has undoubtedly figured *P. muelleri* under the impression that he was figuring *P. atricapilla*.

4. PITTA MUELLERI.

Pitta muelleri, Scl. op. cit. p. 439.

Similar to *P. atricapilla*, but centre of abdomen and crissum bright scarlet; shoulder-patch and broad rump-band very bright shining greenish blue; tail black, sometimes tipped with blue-green.

Young. Similar to the young of *P. atricapilla*, but head less rusty in colour, being, like the chin, decidedly blacker.

Perhaps *P. muelleri* should be placed next to *P. bangkana* on account of the absence of black in the centre of the belly.

5. PITTA SANGHIRANA.

Pitta sanghirana, Scl. op. cit. p. 440.

The larger black median patch allies this species to *P. atricapilla*.

6. PITTA FORSTENI.

Pitta forsteni, Scl. op. cit. p. 442.

Larger than *P. atricapilla* and *P. sanghirana*, and having a green tail, uniform black remiges, and the rump-band and shoulder-patch smaller than in the other five species of this sub-group.

It would be interesting to know whether in the first plumage the young of this species have any white on the remiges.

7. PITTA NOVÆ-GUINÆÆ.

Pitta novæ-guinææ, Scl. op. cit. p. 440.

The variations of colour in this species are most interesting. This *Pitta* is apparently gradually abandoning the ornamental metallic rump-band. Some specimens now before me are already quite free from this mark, and in all it is very dull

and narrow when compared with the band in the section of this genus allied to *P. cucullata*. This loss of ornamentation is being compensated for by a bright metallic band on the breast, directly beneath the black throat.

8. *PITTA MAFOORANA*.

Pitta mafoorana, Sel. op. cit. p. 441.

I have never had an opportunity of examining specimens of this species, but from Gould's figure it seems to be intermediate between *P. novæ-guinæ* and *P. rosenbergi*.

9. *PITTA ROSENBERGI*.

Pitta rosenbergi, Sel. op. cit. p. 441.

This species differs from *P. novæ-guinæ* in having the centre of the belly scarlet, instead of black and scarlet, in the absence of the metallic necklace, and in having purple instead of bluish-green flanks.

The rump-band in four specimens now before me is narrow, but clearly defined and of a silvery green.

The purple on the flanks of the female is not so bright as in the males, and the median patch in one specimen, probably a young female, is mixed with pale pink feathers.

10. *PITTA IRIS*.

Pitta iris, Sel. op. cit. p. 444.

This interesting *Pitta*, peculiar to tropical North Australia, is very rare in collections; unfortunately I have been unable to examine specimens in the first plumage. Whether such specimens would bring this bird more to the yellow-breasted or to the green-breasted group is an open question; but its nearest ally is apparently *P. novæ-guinæ*.

11. *PITTA MAXIMA*.

Pitta maxima, Sel. op. cit. p. 419.

I venture to place this superb bird amongst the green-breasted Pittas, for reasons which I will proceed to point out. The metallic blue rump-band, which in the adult is at the present time reduced to a few feathers, but is, as might be expected, more clearly defined in the first plumage, shows us that this species has been greatly modified. These few bright

feathers are the remains of what was probably at one time a broad band, which has now almost totally disappeared, and leads me to believe that the back of this species was, at some former period, green, the brighter ornamental feathers of the rump-band having taken longer to become modified than the general colouring. The same abandonment of ornamentation is also taking place in *P. novæ-guinææ*, as has been already pointed out. The great physical development of *P. maxima* is probably owing to an abundant food-supply and to a suitable climate.

The young in the first plumage are most interesting, as they show by their whitish throat and yellowish breast a decided resemblance to the members of the buff-breasted group, which was probably their ancestral type.

This lovely bird, we are told by Mr. Wallace, inhabits the rocky forests of the mountainous island of Halmaheira, where it hops about with great activity in the dense tangled forests bristling with rocks. Thinking that the white breast of this *Pitta* might be caused by the bird's surroundings, I wrote to Mr. Wallace, asking him to kindly let me know the colour of the rocks amongst which it lives. In answer to my question whether they were white, he replies:—"The district where my specimens of *Pitta maxima* were obtained was all coral-limestone, very rugged, and covered with scanty shrubby vegetation. This limestone is always full of holes and small caverns, so that it would offer patches of almost white or greyish-white rock, with almost black shadows. The black is, I think, the more important, as being protective to the bird, when seen from above by birds of prey, while the white of the breast would also be assimilated to the rock when seen horizontally by carnivorous reptiles (lizards or snakes), for there are no carnivorous mammals. I believe the bird is also found in the volcanic districts of Gilolo, but here also there is rugged rock full of holes and chasms (black) and scanty vegetation."

It is an interesting speculation whether the continued cast-up glare from the white rock may have influenced the change of colour of the breast of this species.

12. PITTA STEERII.

Pitta steerii, Scl. op. cit. p. 442.

The young have the breast greyish, the median patch pink, each feather being edged with black; there is a distinct speculum on the primaries, which is absent in adults.

This species, as Count Salvadori has pointed out, is allied to *P. maxima*.

c. Group of *P. ussheri*.

This section is composed of five distinct species, four of which grade into each other, while the fifth, *P. arcuata*, connects this group with that of *P. erythrogastra*. *P. arcuata* has the bright post-superciliaries, and, to a less degree, the bright edgings to the wing-coverts of this section,—the green back, chestnut head, and white bases to the scarlet breast-feathers of the next section. The bases of the breast-feathers of the species 2, 3, and 4 are dusky black, which dulls down the vitality of the crimson. In *P. coccinea* the bases of the head-feathers are partly white, while in *P. granatina* they are decidedly blacker. The sexes are similar.

1. PITTA VENUSTA.

Pitta venusta, Scl. op. cit. p. 429.

"Irides dark brown; bill black; legs and feet a beautiful shade of pale blue" (*H. O. Forbes*).

The bases of the centre breast-feathers are white like those of *P. arcuata*, but those of the flanks are dusky black.

2. PITTA USSHERI.

Pitta ussheri, Scl. op. cit. p. 430.

Irides dark brown; bill black; legs and feet slate-blue (*Whitehead*).

The young bird described and figured by Gould in his 'Birds of Asia' (vol. v. pl. 75) I take to be the young of the next species, *P. granatina*, as the head shows traces of a pink tinge where the scarlet patch would be in that species.

3. PITTA GRANATINA.

Pitta granatina, Scl. op. cit. p. 430.

Specimens of this species vary much, the black on the

breast of some of them being much more glossed with purple, while others have a much brighter shade of purple on the back, so much so that Gould thought they might belong to two species, for one of which he proposed the MS. name of *P. adoranda*.

The soft parts are most likely similar to those of *P. ussheri*, *i. e.* legs pale slate-blue.

In the young in first plumage the head and upper parts are dusky black, with a pink tinge on the crown; the post-superciliaries dark blue and scarcely visible; the underparts dusky grey, mixed with pale pink; the wings and tail dull black, glossed and edged with blue; the bill tipped with orange.

4. PITTA COCCINEA.

Pitta coccinea, Sel. op. cit. p. 431.

Similar to *P. granatina*, but the scarlet on the head commences closer to the base of the bill, and is of a lighter or more rosy crimson, which difference in colour is brought about by the bases of the feathers being much whiter than in *P. granatina*. The post-superciliary stripe and wing-coverts are of a deeper blue; while the feathers of the throat are tipped with scarlet. Some specimens are much lighter on the throat than others, and are probably females. The colours of the soft parts are probably like those of *P. granatina*; the young are also similar to those of that species.

5. PITTA ARCUATA.

Pitta arcuata, Sel. op. cit. p. 431.

The young of this species bears a very close resemblance to those of the next group, and *P. arcuata* may be looked upon as the connecting-link between the two sections. They are brown above, shading into dull bluish green on the rump and tail; under surface dull brown, shading into pale pink on the lower part of the belly; flanks and under tail-coverts without a sign of the blue pectoral band; the post-superciliaries are dull green and hardly noticeable. This plumage is almost identical with the nestling plumage in the group

of *P. erythrogastra*, whereas the adult plumage joins this species to the section of *P. ussheri*.

Iris blackish brown; bill dull brown, greyish at the base of lower mandible; legs slate-grey.

d. Group of *P. erythrogastra*.

It is almost impossible to arrange this group satisfactorily, because of the lack of material in the British Museum. Six species (namely, *P. cæruleitorques*, *P. palliceps*, *P. propinqua*, *P. finschi*, *P. loræ*, and *P. kochi*) out of the twelve are not represented in the National collection. It may be said, however, that the group is very compact, all the species having brown or black-and-brown throats, beneath which is a pectoral band of shining greyish blue, sometimes flanked with green, and divided by a black band or otherwise from the bright scarlet breast. The backs are green-and-blue or blue; the heads brown, sometimes striped with blue; the napes brown, chestnut-brown, or bright scarlet. *P. finschi* and *P. loræ* must be very closely allied to *P. mackloti*, specimens of that species differing very much *inter se* in the amount of brown on the nape. In some specimens of *P. mackloti* the brown of the crown changes into dull chestnut on the nape, in others into bright brick-red. Again, the crown is often striped with blue as in *P. celebensis*. *P. mackloti* might probably be split up into a dozen species, all showing slight local variations.

All the young of this group in the nestling plumage are similar, of a dull brown with indistinct pale pink median stripes and dull slate-blue rumps and tails. The legs and feet of the whole group are, I believe, greyish blue, like those of *P. erythrogastra*, and not brown.

1. PITTA ERYTHROGASTRA.

Pitta erythrogastra, Scl. op. cit. p. 432.

The young in first plumage are dull brown above, with greenish-brown secondaries; upper tail-coverts and tail dull slate-blue; beneath, feathers dull whitish brown, edged with darker brown, and of a lighter and more buffish brown on the

flanks; centre of belly and under tail-coverts pale pink. Beak tipped with orange.

The soft parts of the adults are: iris hazel; bill black; legs and feet slate-blue.

2. *PITTA PROPINQUA*.

Pitta propinqua, Scl. op. cit. p. 433.

Of this form I have never seen adult examples, but on comparing the original description with some specimens of the last species, I am much inclined to doubt its claim to specific rank.

3. *PITTA CÆRULEITORQUES*.

Pitta cæruleitorques, Scl. op. cit. p. 433.

4. *PITTA RUFIVENTRIS*.

Pitta rufiventris, Scl. op. cit. p. 434.

“Bill dark horny, feet light bluish lead, iris light olive-brown” (*Wallace*).

5. *PITTA CYANONOTA*.

Pitta cyanonota, Scl. op. cit. p. 435.

6. *PITTA RUBRINUCHA*.

Pitta rubrinucha, Scl. op. cit. p. 435.

Bill blackish horny, feet light bluish lead, iris light olive-brown.

7. *PITTA CELEBENSIS*.

Pitta celebensis, Scl. op. cit. p. 436.

Iris greyish brown, bill black, feet greyish black (*Meyer*).

8. *PITTA PALLICEPS*.

Pitta palliceps, Scl. op. cit. p. 436.

9. *PITTA MACKLOTI*.

Pitta mackloti, Scl. op. cit. p. 436.

The young in first plumage is similar to that of *P. erythrogastra*.

Specimens from New Britain have blue lines on the crown of the head (*Finsch*).

10. *PITTA FINSCHI*.

Pitta finschi, Ramsay, Proc. Linn. Soc. N. S. Wales, ix. p. 864 (1885).

This form is said to be distinguished from *P. mackloti* by having the whole back blue instead of dark green; but specimens are met with intermediate between the two, *i. e.* with green scapulars.

Hab. Astrolabe Mts., New Guinea.

11. *PITTA LORIE*.

Pitta lorie, Salvad. Ann. Mus. Civ. Gen. 2, ix. p. 579.

This *Pitta* is distinguished by having no red on the nape.

Hab. Island Su-a-u, South Cape, New Guinea.

12. *PITTA KOCHI*.

Pitta kochi, Scl. op. cit. p. 433.

This is a somewhat distinct species of this group, judging by Gould's figure (vol. v. pl. 71) in the 'Birds of Asia.'

Genus IV. *EUCICHLA*.

The genus *Eucichla* is composed of seven distinct species, not all closely allied, but still sufficiently so to unite them under one generic title. The first four species have shorter tails than the last three; the first three species are without white markings on the wing-coverts, while the last four are conspicuously marked with that colour. *E. baudi* (sp. 4) is therefore the connecting-link between these two subgroups. The sexes are different.

1. *EUCICHLA CYANEA*.

Pitta cyanea, Scl. op. cit. p. 417.

Though the tail of this species is considerably broader than that of true *Eucichla*, there is little doubt that its nearest allies are to be found in that genus, in which Oates has rightly placed it. The feathers of the breast are barred; the general idea gained by a glance is that they are spotted, but on examining the hidden parts of these feathers they will be seen to be distinctly barred as in true *Eucichla*. The superciliary stripe is intensified on the nape, as in *Eucichla boschi*.

2. *EUCICHLA ELLIOTI*.

Eucichla ellioti, Scl. op. cit. p. 448.

I have not been able to examine specimens of this rare *Pitta*, but venture to place it next to *E. cyanea* on account of the absence of white on the greater wing-coverts and secondaries, and because its tail is shorter than in typical *Eucichla*.

3. *EUCICHLA GURNEYI*.

Eucichla gurneyi, Scl. op. cit. p. 448.

The absence of white on the greater wing-coverts and on the secondaries, the pale blue tail, and blue head are sufficient to indicate the relationship of this species to *E. ellioti*.

4. *EUCICHLA BAUDI*.

Pitta baudi, Scl. op. cit. p. 444.

This beautiful *Pitta* must, I think, find its place between *E. gurneyi* and *E. boschi*. The blue head (of which the feathers in both species are long and narrow) and its blue tail and tail-coverts show its relation to the first species, while its broadly white-edged greater and secondary wing-coverts and dark blue breast betray its alliance to the latter. In Borneo I was fortunate in shooting a male, which I judge to be in the second plumage; it differs, at any rate, somewhat considerably from specimens from Baram. It has no blue band on the nape, the blue crown near the nape is distinctly marked with crimson; the black on the breast descends further down; the sides of the upper part of the breast are of a coppery reddish purple; the belly is bluish purple; the flanks are slightly barred with orange-red; the lower belly and crissum are pinkish white. The first plumage of the male I have not seen. The iris and bill of this species are black and the legs slate-blue.

The unbarred under surface of the female might raise objections to placing this species with *Eucichla*, but the wings and the sudden change of colour from brown to blue at the tail-coverts are surely true appurtenances to *Eucichla*.

Could remarks of the figures in Elliot's Monograph that they "are represented with a conspicuous white band across

the lower rump, of which there is no trace in the bird itself." In the four males now before me two have the lower belly and crissum dull pinkish white; as these feathers are long they often (as in other skins of true *Eucichla*) get crossed over the upper tail-coverts, and in this position they have doubtless been depicted by the artist.

5. *EUCICHLA BOSCHI*.

Eucichla boschi, *Scl. op. cit.* p. 447.

The dark blue breast, white throat, and white edgings to the wing-coverts and secondaries ally this species to *E. baudi*, while its long dark blue tail and golden-orange superciliary stripe assimilate it to the next species.

"Irides dark brown; bill black; legs in front dirty blue, behind pale straw-colour" (*H. O. Forbes*).

The young in first plumage is similar to the adult female, but without any yellow or orange on the superciliary stripe, which is yellowish brown, the feathers slightly edged with black; the throat is pale whitish brown, the feathers being edged with black on the sides of neck; the white on the wing-coverts is less, and the tail is of a lighter blue; the bill has been tipped with some lighter colour, probably yellow.

Males in not quite full plumage (probably the second moult) differ from the fully adult male slightly; the orange on the head does not commence so near the eye, and the feathers of the flanks are also slightly barred with orange, as in *E. baudi*.

6. *EUCICHLA SCHWANERI*.

Eucichla schwaneri, *Scl. op. cit.* p. 446.

I did not note the colour of the soft parts in this species, but I should imagine bluish grey would be the colour of the legs and feet—not brown as is given in the *B. M. Catalogue*.

The young of this species I have not seen.

7. *EUCICHLA CYANURA*.

Eucichla cyanura, *Scl. op. cit.* p. 445.

In this species there is less white on the wing-coverts than in *E. schwaneri*. The bill is black, the iris blackish brown, and the legs dull bluish grey.

Some males are of a richer or more orange-yellow on the breast and superciliaries, and of a richer reddish-brown tinge on the back than others.

In the first plumage the young male has no yellow on the head; the feathers of the crown are brown edged with black; the superciliary stripe is light yellowish brown; the stripe beneath the eye is similar to that of the adult female; the throat and sides of the neck are dull white, the feathers slightly edged with black; there is no black pectoral band; the breast is light brown, the feathers being tipped with black, not barred; the wing-coverts are spotted with brown; the back is dusky brown; there is no blue on the rump.

XLVI.—*Notes on certain Species of New-Zealand Birds.*

By W. W. SMITH, Ashburton, N.Z.

ALTHOUGH the New-Zealand avifauna is the most perfectly known division of our zoological province, new facts in the life-history of some of the species are occasionally presented to the ornithologist. Sir Walter Buller's charming delineations of bird-life in all its peculiar forms in New Zealand, together with Mr. Keulemans's exquisitely finished and life-like pictures of many species illustrating Buller's work, have produced an ever-increasing and lasting interest in our remarkable birds. If Mr. Keulemans had studied bird-life in forests and lakes and sea-shores in New Zealand for many years, he could not have depicted the birds in more natural postures, or painted their haunts to greater perfection. In the individual history of most species Buller has left little of interest to be added; in others additional features in their habits will transpire as colonization spreads and the country becomes more settled. Since the second edition of the '*Birds of New Zealand*' appeared in 1887, I have been able to gather additional notes on the habits of many species, some of which I now offer; I also add some observations on the causes of the extinction and gradual disappearance of certain native birds.